Patent Application Number: 10/670,902
Attorney Docket Number: A2227-US-NP

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

On behalf of

Karen M. **BRAUN**

APPELLANT

APPLICATION: **10/670,902** EXAMINER: **P. Dhingra**

FILED: **September 25, 2003** GROUP: **2625**

CONFIRMATION: **6024**

TITLE: **A METHOD FOR IMPROVED PRINTER CHARACTERIZATION**

APPELLANT'S BRIEF ON APPEAL

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FOR: A METHOD FOR IMPROVED PRINTER CHARACTERIZATION

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

Sir:

APPEAL BRIEF FOR APPELLANT

This Appeal Brief is being submitted in accordance with the Notice of Appeal, filed on March 23, 2009, in connection with the above-identified application.

I. REAL PARTY OF INTEREST

The party of real interest to this appeal is the Assignee, Xerox Corporation.

II. RELATED APPEALS AND INTERFERENCES

The Appellant knows of no other pending appeals or interferences that are related to this instant appeal.

III. STATUS OF CLAIMS

Claims 1-17 have been previously presented in this application. Claim 4 has subsequently been canceled without prejudice or disclaimer to the subject matter contained therein. Claims 1-3 and 5-17 remain pending in the present application. Claims 1-3 and 5-17 are appealed.

IV. STATUS OF AMENDMENTS

The Appellant submitted a Response under 37 C.F.R. 1.116 on January 27, 2009, wherein claim 5 was amended. The Examiner indicated that the amendment would be entered upon Appeal in the Advisory Action, dated April 21, 2009. The Appellant has not filed any other Responses and/or Amendments subsequent to the Final Office Action, dated December 23, 2008.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In accordance with 37 C.F.R. 41.37(2)(c)(v), the following are concise explanations of the subject matter defined in the independent claim (1) involved in this Appeal.

Independent claim 1 recites a method for improving printer characterization to more accurately reproduce desired colors on a destination printing device given the ambient illumination at the location where the printer's output is intended to be viewed (see, for example, Figure 2 and paragraphs **[0004]** through **[0007]**, **[0010]** through **[0012]**, and **[0020]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 1, line 19 through page 2, line 28; page 3, line 7 through page 4, line 2; and page 5, line 23 through page 6, line 4 of the originally filed application).

The method produces a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others (see, for example, paragraphs **[0015]** through **[0016]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 4, lines10-27, of the originally filed application); views the target under the illumination for which characterization is desired (see, for example, paragraphs **[0015]** through **[0016]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 4, lines10-27, of the originally filed application); selects a best metameric pair match from the metameric pairs, which estimates the viewing illumination (see, for example, paragraphs **[0015]** through **[0016]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 4, lines10-27, of the originally filed application); enters an indicator of the estimated viewing illumination (see, for example, paragraphs **[0015]** through **[0016]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 4, lines10-27, of the originally filed application); and adjusts the characterization data to correspond to the estimated viewing illumination (see, for example, paragraphs **[0015]** through **[0016]** of US Published Patent Application 2005/0068550 corresponding to the above-identified application and page 4, lines10-27, of the originally filed application).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Rejection of Claims 1-3, 5, and 7-17 under 35 U.S.C. §103

The issue is whether claims 1-3, 5, and 7-17 are patentable over Newman et al. (Published US Patent Application 2003/0020727) in view of Yamamoto (Published US Patent Application 2002/0158933) in accordance with 35 U.S.C. §103.

VII. ARGUMENTS

Claims 1 and 7-17 have been rejected under 35 U.S.C. §103 as being unpatentable over Newman et al. (Published US Patent Application 2003/0020727) in view of Yamamoto (Published US Patent Application 2002/0158933). This rejection under 35 U.S.C. §103 is respectfully traversed.

In formulating the rejection under 35 U.S.C. §103, the Examiner alleges that Newman et al. discloses producing a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others (Figures 4 and 6 and paragraphs **[0045]**-**[0059]**, **[0063]**, **[0064]**, and **[0067]** of Newman et al.). However the Examiner recognizes that Newman et al. fails to disclose viewing the target under the illumination for which characterization is desired; selecting a best match from the metameric pairs, which estimates the viewing illumination; entering an indicator of the estimated viewing illumination; and adjusting the characterization data to correspond to the estimated viewing illumination.

To meet these deficiencies in Newman et al., the Examiner cites the teachings of Yamamoto. The Examiner alleges that Yamamoto discloses, at paragraphs **[0060]**-**[0073]**, viewing the target under the illumination for which characterization is desired; selecting a best match from the metameric pairs, which estimates the viewing illumination; entering an indicator of the estimated viewing illumination; and adjusting the characterization data to correspond to the estimated viewing illumination.

Based upon these allegations, the Examiner concludes that Newman et al. in view of Yamamoto would render the presently claimed invention obvious. These allegations and conclusion are respectfully traversed.

Independent Claim 1

Independent claim 1 recites a method for improving printer characterization to more accurately reproduce desired colors on a destination printing device given the ambient illumination at the location where the printer's output is intended to be viewed. The method produces a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others; views the target under the illumination for which characterization is desired; selects a best metameric pair match from the metameric pairs, which estimates the viewing illumination; enters an indicator of the estimated viewing illumination; and adjusts the characterization data to correspond to the estimated viewing illumination.

In contrast, as recognized by the Examiner, Newman et al. fails to disclose, in Figures 4 and 6, viewing the target under the illumination for which characterization is desired and utilizing this viewing of the target under the illumination for which characterization is desired to select one of the metameric pairs.

With respect to Yamamoto, the Examiner asserts that Yamamoto teaches viewing the target under the illumination for which characterization is desired and selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination. This assertion by the Examiner is contrary to the actual teachings of Yamamoto.

Initially, Yamamoto, at paragraph **[0011]**, discloses:

> The dependence of the way in which a color is perceived by the unaided eye on the type of illuminating light (as in the case of composite black) is not a particularly desirable feature, creating a need for making a particular color look the same irrespective of the type of illuminating light. In other words, the appearance of a color should not depend on the type of light source used. Gray colors should preferably be reproduced by maximizing the use of black ink in order to reduce the dependence of color appearance on light sources.

In addition, Yamamoto, at paragraph **[0025]**, discloses:

> According to this method, images can be printed by selectively using a first color conversion lookup table with a comparatively good non-dependence of color appearances on the light source, and a second color conversion lookup table with comparatively good image graininess, making it possible to obtain an image quality that is in line with user preferences or particular image applications.

In other words, Yamamoto, at paragraphs **[0011]** and **[0025]**, discloses that the characterization is not to be dependent upon the type of illuminating light. Yamamoto discloses a desire to provide color reproduction that is not dependent upon the illumination under which the colors will be viewed.

Moreover, Yamamoto, at paragraphs **[0067]** and **[0068]**, discloses:

> FIG. 10 is a diagram illustrating the manner in which the color difference ΔE of gray color patches is distributed. In the example shown, the gray color patches are divided into a plurality of groups in accordance with the color difference ΔE, and the borderlines between the groups are shown by thick lines. The color difference ΔE commonly tends to increase with an increase in the ink amount of composite black. A smaller color difference ΔE is preferred because it reduces the dependence of color appearance on the light source and the extent to which shades or hues other than gray are admixed. Considerations related to image graininess also suggest that the use of black ink K alone may be forgone and that composite black may preferably be used. In particular, the graininess of comparatively bright image areas can be improved further through the use of the light inks LC and LM instead of the dark inks C and M.
>
> In step S6 (FIG. 8), a plurality of patches for reproducing gradations of gray color are selected from among the patches whose color difference ΔE is below a specific threshold value Δ. In FIG. 10, the positions of the gray color patches thus selected are shown by solid circles. In this example, the threshold value Δ of the color difference ΔE is 3. Of the plurality of patches having the same gray tone level, those with the maximum ink amount of composite black are selected until the effective ink amount of each primary color in the composite black reaches 12% (to a total of 36%). This is done in order to improve the graininess and banding in highlighted areas (bright areas).

As set forth above, Yamamoto discloses that the spectral reflectance of the gray color patches are measured under a standard light D50 and a standard light A to create tristimulus values $(X,Y,Z)_{D50}$ and $(X,Y,Z)_{A}$. Yamamoto further discloses that the created tristimulus values are used to calculate a color difference, ΔE, of L*a*b* color space. The color difference, ΔE, is used to select the gray color patches which are used in generating a color conversion look-up table (LUT).

Therefore, Yamamoto fails to disclose that the target is actually viewed under the illumination for which characterization is desired prior to selecting the metameric pair. More specifically, Yamamoto teaches that the spectral reflectance of the gray color patches are measured under two standard light sources, D50 and A.

In addition, Yamamoto fails to teach or suggest any observation of the target under the illumination for which characterization is desired so that a best metameric pair match from the metameric pairs, which estimates the viewing illumination, is selected, as set forth by independent claim 1, because the color conversion LUT is generated based on a difference relationship between measured spectral reflectance of the gray color patches under two standard light sources.

Yamamoto fails to teach or suggest that the calculated color difference, ΔE, provides a best metameric pair match from the metameric pairs, which estimates the viewing illumination. As noted above, Yamamoto teaches, "Gray colors should preferably be reproduced by maximizing the use of black ink in order to reduce the dependence of color appearance on light sources." To realize this reduction in dependence, Yamamoto teaches that the spectral reflectance of the gray color patches are measured under two standard light sources, D50 and A, and a calculated color difference, ΔE, which is illumination independent , is used to provide the desire color characterization.

Therefore, contrary to the Examiner's assertion, Yamamoto fails to teach or suggest viewing the target under the illumination for which characterization is desired and selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination, as set forth by independent claim 1.

In rebuttal, the Examiner asserts that Yamamoto teaches selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination. As noted by the Examiner, Yamamoto teaches the calculation of a color difference, ΔE, based upon observed color differences when the patches are illuminated by a standard D_{50} light source and a standard A light source.

As correctly noted by the Examiner, Yamamoto teaches observing the patches under two different light sources; however, which illumination source (D_{50} or A) is the selected patch or patches estimating?

Contrary to the Examiner's contentions, Yamamoto teaches, at paragraph **[0067]**, "A smaller color difference ΔE is preferred because it reduces the dependence of color appearance on the light source and the extent to which shades or hues other than gray are admixed."

Yamamoto explicitly teaches that **the patch or patches are selected to reduce the dependence of color appearance on the light source**, not based upon the estimation of the light source.

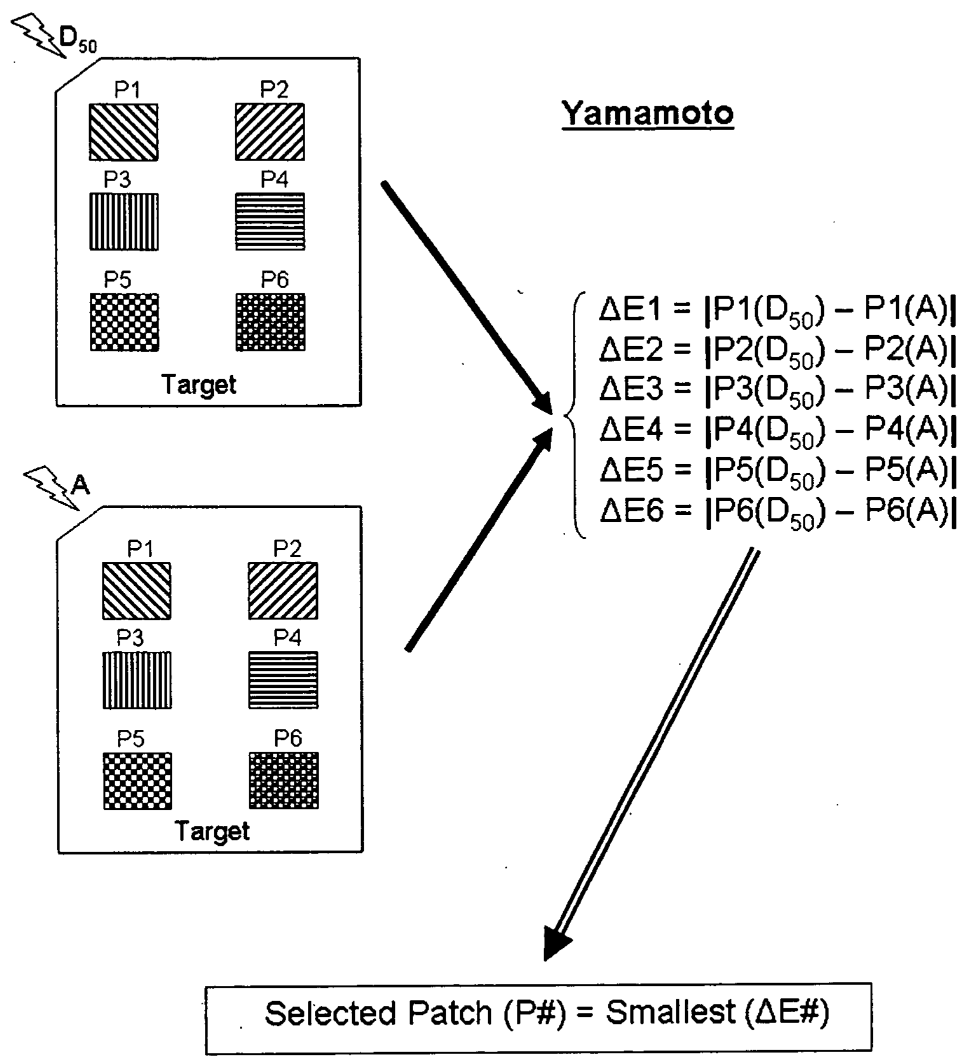
In other words, **Yamamoto explicitly teaches away from selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination** because Yamamoto teaches a desire to select a patch that represent an independence from any particular light source.

It is clear from a proper consideration of the entire teachings of Yamamoto that the Examiner's assertions are based on cherry-picked statements, which have been taken out of context.

When considered in the proper context, Yamamoto teaches measuring patches illuminated by two standard colors sources (D_{50} or A), determining the color difference, ΔE, and selecting a color patch that corresponds to the smallest color difference, ΔE, so that the patch represents an illumination independent characterization.

The following diagram provides an illustration of the process taught by Yamamoto.

<u>Yamamoto</u>



As illustrated above and taught by <u>Yamamoto</u>, a target, with various patches, is illuminated by illumination source D_{50} and color measurements for each patch is taken. The target, with various patches, is illuminated again, but by illumination source A, and color measurements for each patch is taken.

For these two illuminations, <u>Yamamoto</u> teaches that, for each patch, two color measurements (P#(D_{50}) & P#(A)) are generated. A color difference, ΔE(#), for each patch, is determined from the associated two color measurements. These color differences are processed to determine the smallest color difference, ΔE(#), wherein the smallest color difference, ΔE(#), is used to select the patch for the color characteristic process.

As taught by Yamamoto, the selection of the patch for the color characteristic process is independent of viewing illumination as the color difference calculation normalized the color measurements, thereby reducing the dependence of the color characteristic process on the viewing illumination.

Thus, the Examiner has improperly construed passages from Yamamoto in a vacuum without appropriate consideration of the context of the passages.

In further rebuttal, the Examiner asserts that the claim only mentions illumination and is not limited to only one illuminant.

As set forth in claim 1, the target is viewed under **the** illumination for which characterization is desired. It is noted that the claim uses the definitive article, **the**, to define the illumination. In other words, the use of the definitive article grammatically indicates that the illumination has a precedent identification (definition). Therefore, claim 1 sets recites more than illumination, but defines the illumination.

Moreover, claim 1 clearly sets forth that the precedent identification of the illumination is the ambient illumination at the location where the printer's output is intended to be viewed.

Therefore, contrary to the Examiner's rebuttal, claim 1 expressly defines the illumination as the ambient illumination at the location where the printer's output is intended to be viewed.

If the Examiner believes that the claim supports a different interpretation, the Examiner is respectfully requested to specifically point out the precedent identification of the Illumination in claim 1.

In summary, the Examiner recognizes that Newman et al. fails to teach or suggest viewing the target under the illumination for which characterization is desired and selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination.

Moreover, Yamamoto fails to teach or suggest viewing the target under the illumination for which characterization is desired and selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination, as set forth by independent claim 1.

Therefore, the combined teachings of Newman et al. and Yamamoto fail to teach or suggest viewing the target under the illumination for which characterization is desired and selecting a best metameric pair match from the metameric pairs, which estimates the viewing illumination, as set forth by independent claim 1.

Dependent Claim 2

Dependent claim 2 recites a method for improving printer characterization to more accurately reproduce desired colors on a destination printing device given the ambient illumination at the location where the printer's output is intended to be viewed. The method produces a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others; views the target under the illumination for which characterization is desired; selects a best metameric pair match from the metameric pairs, which estimates the viewing illumination; enters an indicator of the estimated viewing illumination; and adjusts the characterization data to correspond to the estimated viewing illumination; wherein the production of the target comprises choosing a base color; and for each illuminant of interest, determining a metameric match to the base color; and placing the base color adjacent to the metameric match to form a matched pair.

As recognized by the Examiner, Newman et al. fails to disclose the production of the target comprises choosing a base color; and for each illuminant of interest, determining a metameric match to the base color; and placing the base color adjacent to the metameric match to form a matched pair.

With respect to Yamamoto, the Examiner asserts that Yamamoto teaches the production of the target comprises choosing a base color; and for each illuminant of interest, determining a metameric match to the base color; and placing the base color adjacent to the metameric match to form a matched pair. This assertion by the Examiner is contrary to the actual teachings of Yamamoto.

As set forth above, Yamamoto explicitly teaches that **the patch or patches are selected to reduce the dependence of color appearance on the light source**, not a process based upon each illuminant of interest.

In other words, **Yamamoto explicitly teaches away from determining a metameric match to the base color and placing the base color adjacent to the metameric match to form a matched pair for each illuminant of interest** because Yamamoto teaches a desire to select a patch that represent an independence from any particular light source. Thus, Yamamoto teaches a selection process that is not tied to or dependent upon each illuminant of interest.

Therefore, the combined teachings of Newman et al. and Yamamoto fail to teach or suggest the production of the target comprises choosing a base color; and for each illuminant of interest, determining a metameric match to the base color; and placing the base color adjacent to the metameric match to form a matched pair, as set forth by dependent claim 2.

Dependent Claim 17

Dependent claim 17 recites a method for improving printer characterization to more accurately reproduce desired colors on a destination printing device given the ambient illumination at the location where the printer's output is intended to be viewed. The method produces a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others; views the target under the illumination for which characterization is desired; selects a best metameric pair match from the metameric pairs, which estimates the viewing illumination; enters an indicator of the estimated viewing illumination; and adjusts the characterization data to correspond to the estimated viewing illumination.

Dependent claim 17 further recites that one half of each matched metameric pair is produced with blacK (K) only and the other half is produced with Cyan, Magenta, and Yellow (CMY).

Moreover, dependent claim 17 further recites producing the metameric pairs comprises, for each illuminant of interest, printing Cyan, Magenta, Yellow, and blacK (CMYK) sweeps; measuring color values of the CMYK sweeps; building gray-balanced Tone Reproduction Curves based on the measured color values; inputting a value *n* into the gray-balanced Tone Reproduction Curves to determine CMY colorant values; and inputting the value *n* into the gray-balanced Tone Reproduction Curves to determine K colorant value.

As recognized by the Examiner, Newman et al. fails to disclose building gray-balanced Tone Reproduction Curves based on the measured color values; inputting a value *n* into the gray-balanced Tone Reproduction Curves to determine CMY colorant values; and inputting the value *n* into the gray-balanced Tone Reproduction Curves to determine K colorant value.

With respect to Yamamoto, the Examiner asserts that Yamamoto teaches building gray-balanced Tone Reproduction Curves based on the measured color values; inputting a value *n* into the gray-balanced Tone Reproduction Curves to determine CMY colorant values; and inputting the value *n* into the gray-balanced Tone Reproduction Curves to determine K colorant value. This assertion by the Examiner is contrary to the actual teachings of Yamamoto.

As set forth above, dependent claim 17 explicitly sets forth that the measured color values are based upon sweeps printed for each illuminant of interest. Yamamoto explicitly teaches a process **to reduce the dependence of color appearance on the light source**, not a process based upon each illuminant of interest.

In other words, **Yamamoto explicitly teaches away from building gray-balanced Tone Reproduction Curves based on the measured color values, which are dependent upon each illuminant of interest** because Yamamoto teaches a desire to select a patch that represent an independence from any particular light source. Thus, Yamamoto teaches a selection process that is not tied to or dependent upon each illuminant of interest.

Therefore, the combined teachings of Newman et al. and Yamamoto fail to teach or suggest producing the metameric pairs comprises, for each illuminant of interest, printing Cyan, Magenta, Yellow, and blacK (CMYK) sweeps; measuring color values of the CMYK sweeps; building gray-balanced Tone Reproduction Curves based on the measured color values; inputting a value *n* into the gray-balanced Tone Reproduction Curves to determine CMY colorant values; and inputting the value *n* into the gray-balanced Tone Reproduction Curves to determine K colorant value, as set forth by dependent claim 17.

With respect to dependent claims 3, 5-16, these claims stand and fall with the patentability of independent claim 1.

Accordingly, in view of all the reasons set forth above, the Honorable Board is respectfully requested to reconsider and overturn the present rejections under 35 U.S.C. §103.

Conclusion

Accordingly, for all the reasons set forth above, the Honorable Board is respectfully requested to reverse all the outstanding rejection. Also, an early indication of allowability is earnestly solicited.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (APPEALED) A method for improving printer characterization to more accurately reproduce desired colors on a destination printing device given the ambient illumination at the location where the printer's output is intended to be viewed, comprising:

a) producing a target consisting of pairs of metamers, where each pair matches for one illuminant and mismatches for others;

b) viewing said target under the illumination for which characterization is desired;

c) selecting a best metameric pair match from said metameric pairs, which estimates said viewing illumination;

d) entering an indicator of said estimated viewing illumination; and

e) adjusting the characterization data to correspond to said estimated viewing illumination.

2. (APPEALED) A method for improving printer characterization, as in claim 1, wherein the production of the target comprises:

a) choosing a base color; and

b) for each illuminant of interest,

determining a metameric match to said base color; and

placing said base color adjacent to said metameric match to form a matched pair.

3. (APPEALED) A method for improving printer characterization, as in claim 2, wherein said metameric matched pairs are produced using different colorants.

5. (APPEALED) A method for improving printer characterization, as in claim 1, further converting said base color to device values, CMYK, using said re-characterization.

6. (APPEALED) A method for improving printer characterization, as in claim 1, wherein the target includes either bipartite patches, concentric patches, readability tasks, or half-and-half images.

7. (APPEALED) A method for improving printer characterization, as in claim 1, further rendering an illumination-determination target on a color reproduction device.

8. (APPEALED) A method for improving printer characterization, as in claim 7, wherein the illumination-determination target has been prepared in advance of characterization.

9. (APPEALED) A method for improving printer characterization, as in claim 8, wherein the illumination-determination target is shipped or otherwise provided with said destination printing device.

10. (APPEALED) A method for improving printer characterization, as in claim 1, wherein said indicator is entered via a Digital Front End or print driver to the printer.

11. (APPEALED) A method for improving printer characterization, as in claim 1, further comprising a Graphical User Interface for indicating said estimation of illumination.

12. (APPEALED) A method for improving printer characterization, as in claim 1, wherein each illuminant of interest represented in said illumination-determination target is a profile.

13. (APPEALED) A method for improving printer characterization, as in claim 12, wherein said profile is applied as a result of the indication of illumination.

14. (APPEALED) A method for improving printer characterization, as in claim 1, wherein said estimated illumination is used to modify said characterization via a pre-transformation or post-transformation.

15. (APPEALED) A method for improving printer characterization, as in claim 1, wherein device values for metameric matches are derived using a cellular Neugebauer model.

16. (APPEALED) A method for improving printer characterization, as in claim 1, wherein one half of each matched metameric pair is produced with blacK (K) only and the other half is produced with Cyan, Magenta, and Yellow (CMY).

17. (APPEALED) A method for improving printer characterization, as in claim 16, wherein producing said metameric pairs comprises, for each illuminant of interest:

a) printing Cyan, Magenta, Yellow, and blacK (CMYK) sweeps;

b) measuring color values of said CMYK sweeps;

c) building gray-balanced Tone Reproduction Curves based on said measured color values;

d) inputting a value *n* into said gray-balanced Tone Reproduction Curves to determine CMY colorant values; and

e) inputting said value *n* into said gray-balanced Tone Reproduction Curves to determine K colorant value.

IX. EVIDENCE APPENDIX

NONE

X. RELATED PROCEEDINGS APPENDIX

NONE